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APPENDIX D

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Hawley's
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Dictionary

THIRTEENTH EDITION

Revised by
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alkene. See olefin.

"Alkor" [Atlas]. TM for a synthetic, furan-type resin cement which is acid- and alkali-proof and used as a mortar cement where temperatures do not exceed 380F.

alkoxyaluminum hydrides. (H_nAlOR_{3-n}).

A group of reducing agents especially useful in converting epoxides to alcohols. Derived by reaction of aluminum hydride with the corresponding alcohol in tetrahydrofuran.

alkyd resin. A thermosetting coating polymer, chemically similar to polyester resins, conventionally made by condensation and polymerization of a dihydric or polyhydric alcohol (ethylene glycol or glycerol) and a polybasic acid (phthalic anhydride), usually with a drying oil modifier. The process requires heating at 230–250C for up to 12 hours. A new and quite different method utilizes epoxy addition polymerization, in which a mixture of glycidyl esters and organic acid anhydrides is heated with a metallic catalyst at 100C or less for only two to four hours. Cost and energy savings and improved application performance are realized by this process.

Use: Alkyd resins are used as vehicles in exterior house paints, marine paints, and baking enamels. Molded alkyd resins are used for electrical components, distributor caps, encapsulation, and a variety of similar applications.

alkyl. A paraffinic hydrocarbon group which may be derived from an alkane by dropping one hydrogen from the formula. Examples are methyl CH_3^- , ethyl $C_2H_5^-$, propyl $CH_3CH_2CH_2^-$, isopropyl $(CH_3)_2CH_2^-$. Such groups are often represented in formulas by the letter *R* and have the generic formula C_nH_{2n+1} .

See aryl.

alkylaryl polyethyleneglycol ether.

Use: In surface-active agents.

See isooctylphenoxypolyoxyethylene ethanol for a typical example of this class of compound.

alkylaryl sulfonate. An organic sulfonate of combined aliphatic and aromatic structure, e.g., alkylbenzene sulfonate.

alkylate. (1) A product of alkylation. (2) A term used in the petroleum industry to designate a branched-chain paraffin derived from an isoparaffin and an olefin, e.g., isobutane reacts with ethylene (with catalyst) to form 2,2-dimethylbutane (neohexane). The product is used as a high-octane blending component of aviation and civilian gasolines. (3) In the detergent industry, the term is applied to the reaction product of benzene or its homologs with a long-chain olefin to form an

intermediate, e.g., dodecylbenzene, used in the manufacture of detergents. It also designates a product made from a long-chain normal paraffin that is chlorinated to permit combination with benzene to yield a biodegradable alkylate. The adjectives *hard* and *soft* applied to detergents refer to their ease of decomposition by microorganisms. See biodegradability; detergent.

alkylation. (1) The introduction of an alkyl radical into an organic molecule. This was one of the early chemical processes used in Germany to furnish intermediates for improved dyes, e.g., dimethylaniline. Other alkylation products are cumene, dodecylbenzene, ethylbenzene, and nonylphenol. (2) A process whereby a high-octane blending component for gasolines is derived from catalytic combination of an isoparaffin and an olefin.

See alkylate (2); neohexane.

alkylbenzene sulfonate. (ABS).

A branched-chain sulfonate type of synthetic detergent, usually a dodecylbenzene or tridecylbenzene sulfonate. Such compounds are known as "hard" detergents because of their resistance to breakdown by microorganisms. They are being replaced by linear sulfonates.

See alkyl sulfonate; linear molecule; detergent; sodium dodecylbenzene sulfonate.

alkyl diaryl phosphate ester. See "Santicizer 141" [Monsanto].

alkyldimethylbenzylammonium chloride.

General name for a quaternary detergent.

See benzalkonium chloride.

alkylene. A phosphated long-chain alcohol.

alkyl fluorophosphate. See diisopropyl fluorophosphate.

alkylolamine. See alkanolamine.

alkyl sulfonate. (linear alkylate sulfonate; LAS).

A straight-chain alkylbenzene sulfonate, a detergent specially tailored for biodegradability. The linear alkylates may be normal or iso (branched at the end only), but are C_{10} or longer.

See sodium dodecylbenzene sulfonate.

alkyne. See acetylene hydrocarbon.

Allan-Robinson reaction. Preparation of flavones or isoflavones by condensing *o*-hydroxyaryl ketones with anhydrides of aromatic acids and their sodium salts.

allantoin. (glyoxyldiureide; 5-ureidohydantoin). $C_4H_6N_4O_3$.

thin-layer chromatography. (TLC). A micro type of chromatography. The thin layer (0.01 inch) is the adsorbent, usually a special silica gel spread on glass or incorporated in a plastic film. Single drops of the solutions to be investigated are placed along one edge of the glass plate, and this edge then dipped into a solvent. The solvent carries the constituents of the original test drops up the thin layer in a selective separation, so that a comparison with known standards and various identifying tests may be made on the spots formed.
See thin.

thinner. A hydrocarbon (naphtha) or oleoresinous solvent (turpentine) used to reduce the viscosity of paints to appropriate working consistency usually just before application. In this sense a thinner is a liquid diluent, except that it has active solvent power on the dissolved resin.

thio-. A prefix used in chemical nomenclature to indicate the presence of sulfur in a compound, usually as a substitute for oxygen.
See thiol.

thioacetamide.

CAS: 62-55-5. CH_3CSNH_2 .

Properties: Colorless leaflets. Mp 115C. Stable in solution. Soluble in water, alcohol, ether, benzene. Combustible.

Hazard: Toxic by ingestion and inhalation, a carcinogen (OSHA).

Use: To replace gaseous hydrogen sulfide in qualitative analysis.

thioacetic acid. (thiacetic acid; ethanethiolic acid).

CAS: 507-09-5. CH_3COSH .

Properties: Clear, yellow liquid; strong, unpleasant odor. D 1.05 (25C), fp -17C, bp 81.8C (630 mm Hg). Soluble in water, alcohol, and ether. Combustible.

Derivation: By heating glacial acetic acid and phosphorus pentasulfide, with subsequent distillation.

Hazard: Toxic by ingestion and inhalation.

Use: Chemical reagent, lachrymator.

thioallyl ether. See allyl sulfide.

thioanisole. $\text{C}_6\text{H}_5\text{CH}_3$.

Properties: Colorless liquid; strong, unpleasant odor. D 1.053 (25C), fp -15.5C, bp 188C, refr index 1.5842 (25C). Insoluble in water; soluble in most organic solvents. Combustible.

Use: Intermediate, solvent for polymeric systems.

thiobenzoic acid. $\text{C}_6\text{H}_5\text{COSH}$.

Properties: Yellow oil or crystals. D 1.1825-1.1835 (20/4C), mp 24C, bp 77.5C (5 mm Hg), 122C (30 mm Hg), refr index 1.602-1.604 (20C). Insoluble in water; miscible with organic solvents. Combustible.

Grade: 95% min.

Use: Organic intermediate.

4,4'-thiobis(6-tert-butyl-m-cresol).

CAS: 96-69-5.

Properties: Light-gray to tan powder. Mp 150C min, d 1.10 (25C).

Hazard: Toxic by inhalation. TLV: 10 mg/m³ of air.

Use: Protection of light-colored rubber from oxidation and of nonstaining neoprene compounds against deterioration.

2,2'-thiobis(chlorophenol).

CAS: 97-18-7. $[\text{ClC}_6\text{H}_4(\text{OH})]_2\text{S}$.

Properties: White, crystalline solid; odorless. Mp 175.8-186.8C. Insoluble in water.

Hazard: Toxic by ingestion.

Use: Bacteriostat for cosmetics, fungicide.

2,2'-thiobis(4,6-di-sec-amyphenol).

(2,2'-thiobis[4,6-bis-(1-methylbutyl)phenol]).

$[(\text{CH}_3[\text{CH}_2]_2\text{CH}[\text{CH}_3])_2\text{OHC}_6\text{H}_3\text{S}]_2$.

Properties: A dark, viscous liquid. Softening p 0C, d 0.99 (50C).

Use: Rubber antioxidant.

thiocarbamide. See thiourea.

thiocarbanil. See phenyl mustard oil.

thiocarbanilide. (*N,N'*-diphenylthiourea; sulfo-carbanilide).

CAS: 102-08-9. $\text{CS}(\text{NHC}_6\text{H}_5)_2$.

Properties: Gray powder. Mp 148C, d 1.32. Soluble in alcohol and ether; insoluble in water. Combustible.

Derivation: Interaction of aniline and carbon disulfide and alcohol in the presence of sulfur.

Use: Intermediates, dyes (sulfur colors, indigo, methyl indigo), vulcanization accelerator, synthetic organic pharmaceuticals, flotation agent, acid inhibitor.

thiocarbonyl chloride. See thiophosgene.

thioctic acid. See *dl*- α -lipoic acid.

thiodiethylene glycol. See thiodiglycol.

thiodiglycol. (thiodiethylene glycol;

β -bis-hydroxyethyl sulfide; dihydroxyethyl sulfide). $(\text{CH}_2\text{CH}_2\text{OH})_2\text{S}$.

Properties: Syrupy, colorless liquid; characteristic odor. D 1.1852 (20C), bp 283C, fp -10C, viscosity 0.652 cP (20C), flash p 320F (160C), bulk d 9.85 lb/gal, refr index 1.5217 (20C). Soluble in acetone, alcohol, chloroform, water; slightly soluble in benzene, carbon tetrachloride, and ether. Combustible.

Derivation: Hydrolysis of dichloroethyl sulfide, interaction of ethylene chlorohydrin and sodium sulfide.

Hazard: Do not use with hydrochloric acid.